"Supporting Visualization of Chemical Content through the Creation of Plastic and Sound Representations"

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Abstract

Learning chemistry is a demanding job for the brain. It is a discipline that poses inherent challenges since it requires using highly specific language and symbols to explain observable phenomena by describing material systems at the microscopic and process levels. To do so, students should be able to visualize material systems and create acceptable mental models of content to access them in the future and to use them in reasoning. This process involves thinking about abstract concepts in a multi-level manner through visuo-spatial thinking, integrating between semantic expressions and visual representations (Cook 2006; Wu and Shah 2004; Vekiri 2002). Thus, the visual thinking abilities and representational competences of chemistry students cannot be overlooked when teaching chemistry.

With these challenges in mind, a neuropedagogy-based, arts-integrating approach to teaching and learning chemistry was developed (Marchak et al 2021a). This approach explicitly addresses visual literacy to support visualization and understanding of chemical content. By this approach, art appreciation and visual literacy techniques were adapted by considering relevant neuro-pedagogical principles to aid students gain visual thinking skills related to chemical content. A conceptual framework emerged (Marchak et al. 2021b) that allows the methodological development of activities specifically designed to address the learning of theoretical, abstract chemistry concepts.

Activities developed by this approach lead students through the consecutive processes of 1) observation and guided analysis of complex images, and 2) creation of graphic, plastic, and sound representations of chemical content. In this lecture we will go through the supporting neuropedagogical, arts-integrating and chemistry principles that were considered during the development of the activities. In addition, two exemplar activities will be presented related to the creation of plastic and sound representations of chemical content.

References:

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